SECTION 16481

MOTOR CONTROL CENTERS (MCC) INSTALLATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawing and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.

1.2 SUMMARY

A. This section includes the following motor control center components: construction, arrangement, and testing for an enclosed, free-standing, floor-mounted, dead-front, low-voltage (600-V-max) MCC.
   1. MCC vertical sections ready for plug-in power distribution and control components.
   2. Combination Motor Starters.
   3. Feeder Breakers.
   4. Modular plug-in equipment structures to mount electrical distribution and control equipment noted above.
   5. Hinged cubical covers with control and pilot devices.

1.3 RELATED SECTIONS

A. The following Section contains requirements that relate to this Section:
   1. Section 16191, Supporting Devices: Mounting Structures.
   2. Section 16196, Electrical Identification.
   3. Section 16483, Motor Control.
   4. Section 16960, Electrical Testing.

1.4 REFERENCES

A. National Electrical Manufacturers Association (NEMA):
   1. ICS 1-1993, General Standards for Industrial Control and Systems.
   2. ICS 2-1993, Standards for Industrial Control Devices, Controllers, and Assemblies.

B. National Fire Protection Association (NFPA):
   1. 70-1999, National Electrical Code (NEC).

C. Underwriters Laboratories, Inc. (UL):
   1. 508-1999, Industrial Control Equipment.
   2. 845-1995, Motor Control Centers.

1.5 SUBMITTALS

A. Submit field test reports for approval.

1.6 QUALITY ASSURANCE

A. NFPA Compliance: equipments and components shall be designed, fabricated, and installed in compliance with NFPA 70.

B. Coordination: Coordinate layout and installation of MCC's with electrical, mechanical, architectural and with other installations.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect equipment and other parts and auxiliary devices or accessories against corrosion, dampness, breakage, or vibration damage that might be encountered in transportation and handling.

B. Store in a clean, dry space.

C. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

D. Handle in accordance with manufacturer written instructions.

E. Lift only with lugs provided for the purpose.

F. Handle carefully to avoid damage to motor control center components, enclosure, and finish.

1.8 SEQUENCING AND SCHEDULING

A. Coordinate size and location of concrete housekeeping bases. Cast anchor-bolt inserts into base.

B. Schedule installation of MCC's to prevent construction damage.

PART 2 - PRODUCTS

2.1 Motor Control Centers are CMFE. See Construction Manager for specification Section 16480EQ for equipment requirements and for actual equipment being provided.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls, floors, and areas for suitable conditions where MCC's are to be installed.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. The following minimum work shall be performed by the Contractor under the technical direction of the manufacturer's service representative:
   1. Rig the MCC assembly into final location and install on level surface.
   2. Check all removable cells and starter units for easy removal and insertion.
   3. Perform insulation tests on each phase and verify low-resistance ground connection on ground bus.
   4. Connect all power wiring and control wiring and verify basic operation of each starter from control power source.
   5. Torque all bolted connections made in the field and verify all factory bolted connections.
   6. Calibrate any solid-state metering or control relays for their intended purpose and make written notations of adjustments on record drawings. Perform startup of any solid-state starters and adjustable frequency drives.
   7. Provide five (5) copies of the manufacturer's field startup report to the CM.

B. Install motor control center in accordance with the drawings and Manufacturer/Vendor's instructions.

C. Install fuses in fusible switches.

D. Select overload settings in motor starters to match installed motor characteristics.

E. Motor Data: Provide neatly typed label inside each motor starter enclosure door identifying motor served, nameplate horsepower, full load amperes, code letter, service factor, and voltage/phase rating.

3.3 FIELD QUALITY CONTROL

A. After receipt of equipment on site at its final installed location, inspect equipment to determine that the equipment has not been damaged in transit.

B. After completion of installation, inspect equipment to determine that the equipment is properly installed, conditioned, and ready to be energized and accept design load.

C. Before energizing the MCC, make the following tests:
1. Take ohmmeter readings between the MCC ground bus and the MCC enclosure. The maximum acceptable resistance shall be 0.01 ohm.
2. Connect a "Kelvin Bridge" between the MCC ground bus (to which the equipment ground conductor is connected) and the nearest building ground bus or ground strap connected directly to the building ground grid. The readings taken will indicate the resistance between the MCC ground bus and the building ground grid. The maximum permissible resistance shall be 0.1 ohm.

D. After completing the above tests, additional checks shall include the following:
1. A visual check of all starter locations, nameplates, etc.
2. A check of all wiring against Manufacturer's and Contractor's drawings.
3. Check ratings of, and make settings on, all over-current protective devices.
4. An operational check of control circuits.
5. A check for tightness of all connections.
6. Check phasing of busses. All busses shall be phased and identified so that circuit breaker phase identification is 1-2-3, left to right, as viewed from the front of the breaker.
    a. MCC phase identification 1-2-3 is equivalent to transformer phase identification Xl-X2-X3 and the installation site's phase identification A-B-C.

E. The main bus in all low-voltage MCCs shall be given an "Insulation Resistance Test" using a 1,000-V insulation tester (Simpson Model 405 or approved equal). Each phase shall be meggered to ground with the other two phases grounded.
1. Apply the voltage for a minimum of 3 min and until the reading reaches a nearly constant value. Tests shall be made with all branch circuit breakers connected to the bus and with all load side conductors disconnected.
2. Minimum acceptable resistance readings shall be 30 megohms.

F. Mechanical and electrical operational tests shall be performed on all breakers and their starters and associated alarm and indicating devices. All interlock devices must be tested operationally.

3.4 CLEANING

A. Clean MCC sections, starters and components with manufacturers' recommended cleaning methods and materials.

3.5 MANUFACTURER'S CERTIFICATION

A. A qualified factory-trained manufacturer's representative shall certify in writing that the equipment has been installed, adjusted and tested in accordance with the manufacturer's recommendations. Equipment shall e inspected prior to the generation of any reports.

B. The Contractor shall provide five (5) copies of the manufacturer's representative's certification.

3.6 TRAINING

A. The Contractor shall provide a training session for up to 2 (two) owner's representatives for (two) normal workdays at the jobsite or other office location chosen by the owner.

B. The training session shall be conducted by a manufacturer's qualified representative.

C. The training program shall consist of the following:
1. Review of the MCC one-line drawings and schedules.
2. Review of the factory record shop drawings and placement of the various cells.
3. Review of each type of starter cell, components within, control, and power wiring.
4. Review contactor coil replacement procedures.
5. Discuss the maintenance timetable and procedures to be followed in an ongoing maintenance program.
6. Provide three-ring binders to participants complete with copies of drawings and other course material covered.

END OF SECTION 16481